We Claim:

| | 1. | A stable pluripotent trophoblast stem (TS) cell line. |
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| | 2. | A purified preparation of trophoblast stem cells which (i) are capable of indefinite |
| 5 | | proliferation in vitro in an undifferentiated state; and (ii) are capable of |
| | | differentiation into cells of the trophoblast lineage in vivo. |
| | 3. | A purified preparation as claimed in claim 2 which is further characterized by |
| | | expression of genetic markers of diploid trophoblast cells. |
| | 4. | A purified preparation as claimed in claim 2 wherein the cells are differentiated into |
| 10 | | cells of the trophoblast lineage. |
| | 5. | A purified cell preparation as claimed in claim 4 characterized by expression of |
| | | genetic markers of diploid trophoblast cells of the ectoplacental cone (EPC), and the |
| | | secondary giant cells of the early conceptus. |
| | 6. | A purified cell preparation as claimed in claim 2"or 4 which is derived from or |
| 15 | | comprised of cells that have been genetically modified either in nature or by genetic |
| | | engineering techniques in vivo or in vitro. |
| | 7. | A purified cell preparation as claimed in claim 6 modified by introducing mutations |
| | | into genes in the cells or by introducing transgenes into the cells. |
| | 8. | A method for producing a trophoblast cell line comprising culturing early |
| 20 | | postimplantation trophoblast cells or cells of a blastocyst on a feeder layer in the |
| | | presence of FGF4, and a co-factor. |
| | 9. | A method as claimed in claim 8 additionally comprising inducing differentiation of |
| | | the cells of the cell line to cells of the trophoblast lineage by removing the FGF4, the |
| | | co-factor, or the feeder layer. |
| 25 | 10. | A method as claimed in claim 8 wherein the early postimplantation trophoblast cells |
| | | or cells of a blastocyst are isolated from a mammalian or marsupial species. |
| | 11. | A method as claimed in claim 8 wherein the early postimplantation trophoblast cells |
| | | or cells of a blastocyst are isolated from a rodent, rabbit, sheep, goat, pig, cattle, |
| | | primate, or human. |
| 30 | 12. | A method as claimed in claim 8 wherein the early postimplantation trophoblast cells |
| | | or cells of a blastocyst are transgenic. |
| | 13. | A method as claimed in claim 8 wherein the feeder layer is a confluent fibroblast layer |
| | | or a medium conditioned by primary embryonic fibroblast cells. |
| | 14. | A method as claimed in claim 8 wherein the feeder layer comprises primary mouse |
| 35 | | embryonic fibroblast (EMFI) cells or STO cells. |
| | 15. | A method as claimed in claim 8 wherein the FGF4 is recombinant FGF4 and the co- |

factor is heparin. 16. A method as claimed in claim 8 which further comprises introducing cells from the cell line into a blastocyst or aggregating the cells with an early stage embryo to produce chimeric conceptuses or placenta. 5 17. A method as claimed in claim 16 wherein the chimeric conceptuses or placenta are engineered to carry selectable markers or genetic alterations. 18. A method as claimed in claim 16 wherein cell lines are derived from the chimeric conceptuses or chimeric placenta. 19. A chimeric conceptus derived from a purified preparation as claimed in claim 2. 10 20. A chimeric placenta derived from a purified preparation as claimed in claim 2. 21. A method for screening for potential therapeutics that modulate trophoblast development or activity comprising subjecting a purified preparation as claimed in claim 2 or claim 4 to a test substance, and comparing the effect of the test substance to a control to determine if the test substance modulates trophoblast development or 15 22. A method for therapeutic treatment of placental defects in a mammal comprising transplanting a purified preparation as claimed in claim 2 or 4 to generate a chimeric placenta in the mammal. 23. A method as claimed in claim 22 wherein the mammal is a human.